REMARKS

Reconsideration of the above-identified application in view of the present amendment is respectfully requested.

The Drawings and Specification have been amended as suggested by the Examiner. Claims 2, 14, and 15 have been amended to correct minor informalities.

Claims 1, 2, and 10-13 have been rejected as anticipated by Frantom et al., US 4,655,312. Claim 14 has been rejected as unpatentable over Frantom et al. in view of Behr, US 5,558,370. Claims 3-9 and 15 have been indicated as containing allowable subject matter.

Allowable claims 3 and 15 have been amended to stand independently. Consequently, claims 3 and 15, as well as claims 4-9 which depend from claim 3, are in condition for allowance.

Claim 1 recites a pretensioner (24) responsive to the signal generated by a sensor (174) for acting on the seat belt webbing (20) to pull an occupant (12) of the vehicle seat (14) backward toward a back portion (18) of the vehicle seat (14). Frantom et al. discloses a seat belt retractor (14) for removing slack in a seat belt (10) under crash conditions before crash loads are applied to the seat belt (10) by the vehicle occupant (Col. 2, lines 22-30). The retractor (14) ceases retracting the seat belt (10) (Col. 3, lines 40-48) when any load is imparted to the seat belt (10) by the occupant. Thus, the retractor (14) of Frantom et al. stops retracting the seat belt (10) before the retractor (14) can

pull the occupant of the vehicle seat backward toward a back portion of the vehicle seat.

Additionally, it is respectfully submitted that the conventional retractor motor (42) of Frantom et al. would not be capable of producing a force sufficient to pull the occupant of the seat backward. The motor (42) is only designed to take up slack (Col. 4, lines 9-12). However, the motor (108) of Fig. 2 is designed to produce a force of 562 lbs. during a crash (Specification, page 37, lines 1-5).

Furthermore, a claim is anticipated only if each and every element as set forth in the claim is found in a single prior art reference. MPEP §2131. The identical invention must be shown in as complete detail as contained in the claim. MPEP §2131. Frantom et al. nowhere discloses the retractor (14) pulling the occupant backward or putting the occupant under any force. Every reference to the retractor (14) in Frantom et al. only states that the retractor (14) takes up slack.

Consequently, it is respectfully submitted that claim 1, as well as claims 2 and 10-14 which depend from claim 1, are in condition for allowance.

New claim 16 recites the limitations of claim 1 as well as a seat belt retractor having three modes of operation. The first mode of operation occurs in an absence of a signal from a first crash sensor and a second impending crash sensor. The second mode of operation occurs upon receipt of a first signal from the first sensor and initiating a first force to pull the occupant backward toward the back portion of the vehicle seat. The third mode of operation occurs upon receipt of a second

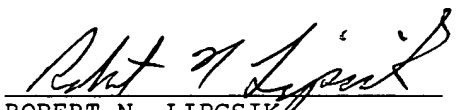
signal from the second sensor and initiating a second force to pull the occupant backward toward the back portion of the vehicle seat. The first force is greater than the second force. Frantom et al., Behr, the other art of record do not disclose a system with these and the other claimed features. Claim 16 is in condition for allowance. (Please note that dependent claim 14 also recites these three modes of operation.)

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version with markings to show changes made**."

In view of the foregoing, it is respectfully submitted that the above identified application is in condition for allowance, and allowance of the above-identified application is respectfully requested.

Please charge any deficiency or credit any overpayment in the fees for this amendment to our Deposit Account No. 20-0090.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Page 12, lines 1-14, of the Specification has been amended, as follows:

--The retractor 26 further includes an electric motor 108 (Fig 2). Preferably, the electric motor 108 is a low inertia, permanent magnet, DC motor. The electric motor 108 includes a rotor 110 and a stator 112. The stator 112 is rotationally fixed and the rotor 110 rotates relative to the stator 112 in a known manner. The electric motor 108 has a mathematical thermal time constant, as is ~~in~~ known in the art, that can be used to calculate the time required to damage the motor by overloading or overheating. As will be discussed below, the thermal time constant can also be used to indicate the amount of time it takes for an electric motor 108 temperature to reach a certain value.--

Page 14, lines 1-24, of the Specification has been amended, as follows:

--The outer surface 128 of the inner cylindrical wall 116 includes a groove 138 that extends around the circumference of the inner cylindrical wall 116. The groove 138 is defined by two surfaces. An inner surface 139 of the groove 138 is cylindrical and extends from first axial end 132 of the inner cylindrical wall 116 of the rotor 110 toward the second axial

end 134 of the inner cylindrical wall 116. ~~rotor 110.~~ The inner surface 139 is centered on an axis B that is angled or tilted from axis A, as shown in Fig. 2. An end surface 141 of the groove 138 extends into the outer surface 128 of the inner cylindrical wall 116 in a direction perpendicular to axis B and connects to the inner surface 139 of the groove 138. Thus, the end wall 141 of the groove 138 is tilted relative to a perpendicular of axis A as the groove 138 extends annularly around the outer surface 128 of the inner cylindrical wall 116 of the rotor 110. Specifically, a portion, indicated as X in Fig. 2, of the groove 138 is nearer the first axial end 132 of the inner cylindrical wall 116 of the rotor 110 and a portion, indicated as Y in Fig. 2, of the groove 138 opposite portion X is nearer the second axial end 134 of the inner cylindrical wall 116 of the rotor 110 so that end wall 141 is perpendicular relative to axis B.--

Page 15, lines 15-19, of the Specification has been amended, as follows:

--Assembly of the electric motor 108 will be discussed below with reference to the assembly of the retractor 26. The electric motor 108 described is for illustration purposes only and ~~that~~ other electric motor designs may be used.--

Pages 22-23, lines 21-24 & 1-8, of the Specification has been amended, as follows:

--The electric motor 108 of the retractor 26 causes rotation of the spool 34. As will be discussed below, the spool 34 will not rotate relative to the housing 44 of the retractor 26 when the electric motor 108 is not energized. The electric motor 108 is energized by electric energy that is communicated to the electric motor 108 through the lead wires (not shown). The lead wires connect to the stator 112 and do not ~~without~~ interfere with the moving parts of the retractor 26. Although not shown in the drawings, the lead wires preferably exit the retractor 26 through an opening in the back wall 46 of the frame 44.--

Page 28, lines 5-18, of the Specification has been amended, as follows:

--The vehicle occupant safety system 10 also includes a force detection device 176 for detecting a force applied to the seat belt webbing 20. Preferably, the force detection device 176 is a micro-electro mechanical (MEMs) strain sensitive transducer. As illustrated in Fig. 1, the force detection device 176 is located on the seat belt webbing 20 adjacent the anchor point 23. ~~anchor 38 for the buckle 36.~~ Those skilled in the art will recognize that the force detection device 176 may be located in other areas of the vehicle occupant safety system 10, such as on the pretensioner 24. ~~seat belt webbing 20.~~ The force detection device 176 detects the force applied to the seat belt webbing 20 and generates a signal indicative of the detected force.--

Pages 33-35, lines 7-24 & 1-24 & 1-6, of the Specification has been amended, as follows:

--If the controller 180 receives a third set of signals, the controller 180 will assume that the vehicle occupant 12 is attempting to withdraw the seat belt webbing 20 from the retractor 26. The third set of signals are signals indicating that no vehicle crash condition exists, that the tongue assembly 28 is not latched in the buckle 36 and the tongue assembly 28 was not just recently unlatched from the buckle 36, and that there is a force being applied to the seat belt webbing 20. Since the controller 180 has not received a signal indicating a vehicle crash condition, the controller 180 will operate the electric motor 108 in the first mode of operation. As a result, the controller 180 will send electric energy having an amperage in the predetermined range to the electric motor 108 of the retractor 26 to cause the spool 34 to rotate in the belt withdrawal direction 170. The controller 180 will cause the spool 34 to rotate in the belt withdrawal direction 170 until the force detection signal generated by the force detection device 176 equals ~~equal~~ zero. When the force detection signal equals zero, the controller 180 will review the signal generated by the buckle sensing switch 178 to determine if the tongue assembly 28 is latched in the buckle 36. If the tongue assembly 28 is latched in the buckle 36, the controller 180 will actuate the retractor 26 to tighten the seat belt webbing 20 around the occupant 12. Thus, the controller 180 will send electric energy having an

amperage in the predetermined range to the electric motor 108. The electric motor 108 will cause the spool 34 to rotate in the belt retraction direction 172. The spool 34 will rotate in the belt retraction direction 172 until a force of a first predetermined level is detected. The first predetermined level of force is a force in the seat belt webbing ranging from about 0.5 pounds-force to about 3 pounds-force. Preferably, the first predetermined level of force is about 1 pound-force. The force of a first predetermined level is detected by the force detection device 176 and will indicate a snug fit of the seat belt webbing 20 around the occupant 12. Particularly, the first predetermined level of force indicates a snug fit of the torso portion 40 of the seat belt webbing 20. If the controller 180 determines that the tongue assembly 28 is not latched in the buckle 36, the controller 180 will cause the spool 34 to rotate in the belt retraction direction 172 until the seat belt webbing 20 is in the retracted position.--

Page 40, lines 4-14, of the Specification has been amended, as follows:

--From the above description of the invention, those skilled in the art will perceive improvements, changes and modifications. For example, additional structure may connect the wobble gear 148 to the frame 44 to prevent rotation of the wobble gear 148. If such structure is used, the structure must not interfere with a wobbling movement of the wobble gear

148, as ~~will be~~ described above. ~~below.~~ Also, the electric motor 108 may be a variable reluctance motor. Such improvements, changes and modifications within the skill of the art are intended to be covered by the appended claims.

IN THE CLAIMS:

Claims 2, 3, 14, and 15 have been amended, as follows:

2. (Amended) The system of claim 1 further being defined by:

the electric motor being drivingly connected to the spool by a gear assembly; and

a portion of the spool forming part of the gear assembly.

3. (Amended) A vehicle occupant safety system for helping to protect an occupant of a vehicle seat during a crash condition, the system comprising:

at least one sensor for sensing a vehicle crash condition and generating a signal indicative of the crash condition;

seat belt webbing for extending around the vehicle occupant; and

a pretensioner responsive to the signal generated by the sensor for acting on the seat belt webbing to pull an occupant of the vehicle seat who is forward in the vehicle seat backward toward a back portion of the vehicle seat,

the pretensioner comprising a seat belt retractor, the seat belt retractor including a spool on which the seat belt webbing is wound and an electric motor for rotating the spool in a belt retraction direction to pull the occupant backward toward the back portion of the vehicle seat, ~~The system of claim 1 further being defined by:~~

the electric motor being drivingly connected to the spool by a non-backdrivable gear assembly;

the non-backdrivable gear assembly further being a locking mechanism that prevents rotation of the spool when the electric motor is not energized.

14. (Amended) The system of claim 10 further including:

an inertial yaw stability, an extreme vehicle speed, or a proximity sensor for determining if a crash condition is impending and generating a signal indicative of the impending condition,

the electric motor further including a third mode of operation, the electric motor operating in the third mode of operation upon receiving the signal indicative of the impending condition, ~~from the proximity sensor,~~ the third mode of operation causing the electric motor to actuate the pretensioner to rotate the spool in the belt retraction direction to pull the occupant backward toward the back portion of the vehicle seat, the third mode of operation resulting in a force on the seat belt webbing that is less than a force generated in the second mode of operation.

15. (Amended) A vehicle occupant safety system for helping to protect an occupant of a vehicle seat during a crash condition, the system comprising:

at least one sensor for sensing a vehicle crash condition and generating a signal indicative of the crash condition;

seat belt webbing for extending around the vehicle occupant;

a pretensioner responsive to the signal generated by the sensor for acting on the seat belt webbing to pull an occupant of the vehicle seat who is forward in the vehicle seat backward toward a back portion of the vehicle seat; and

~~The system of claim 10 further including:~~

a gear assembly for transmitting power from an ~~the~~ electric motor to a ~~the~~ spool on which the seat belt webbing is wound, rotation of the electric motor causing wobbling of a part of the gear assembly, wobbling of the ~~a~~ part of the gear assembly causing rotation of the spool in a belt retraction direction.

Claim 16 has been added.